Inhuman shields — children caught in the crossfire of domestic violence

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Background. Child abuse is a worldwide scourge. One of its most devastating manifestations is non-accidental head injury (NAHI).

Methods. This is a retrospective chart review of children presenting to the Red Cross Children's Hospital trauma unit with a diagnosis of NAHI over a 3-year period.

Results. Sixty-eight children were included in the study and 2 different groups were identified. Fifty-three per cent of the children were deliberately injured (median age 2 years), while 47% were allegedly not the intended target of the assailant (median age 9 months). The assailant was male in 65% of the intentional assaults and male in 100% of the unintentional assaults, with the intended adult victim female in 85% of the latter cases. Overall, 85% of the assaults were committed in the child's own home.

Conclusions. The high proportion of cases in which a young child was injured unintentionally suggests that these infants effectively become shields in assaults committed by adults. In this context any attempts to deal with child abuse must also address the concurrent intimate partner violence.

S Afr Med J 2004; **94:** 293-296.

Child abuse is a worldwide scourge. This most often takes the form of physical, sexual and psychological mistreatment but may also encompass neglect and other forms of maltreatment of children. These various manifestations probably reflect different cultural values, social norms and societal pressures such as socio-economic deprivation.

The dire consequences of physical abuse on the child's brain were highlighted initially by the paediatrician Henry Kempe and his co-workers,[1] and expanded on by John Caffey, a paediatric radiologist.[2]

Various different terms have been used, but non-accidental injury (NAI) includes any injury sustained as a result of child abuse. Craniocerebral injury sustained in this context may be termed non-accidental head injury (NAHI).

A major focus of interest has been the shaken baby syndrome (SBS), a clearly defined form of child abuse that occurs mainly in infants. Attention has also been drawn to the role of impact in the genesis of these traumatic brain injuries, particularly in the seminal work of Duhaime and colleagues.[3,4] Based on a thorough examination of the biomechanics of infantile head injury, this group proposed the term shaking-impact syndrome (SIS).[3,4]

Brown and Minns[5] have, however, pointed out that NAHI may also be due to penetrating or compressive injuries, in addition to the mechanisms of impact and whiplash/shaking.

We sought to identify the mechanisms and circumstances of injury in children presenting with NAHI to the Red Cross Children's Hospital (RCH) in Cape Town.

Patients and methods

Patient selection

This was a retrospective hospital-based study conducted at RCH in Cape Town, South Africa. The trauma unit serves a major metropolitan area and all instances of possible child abuse are reported to the social work department for investigation, as described previously.[6]

The trauma unit register for the period June 1998 - June 2001 was reviewed and all children who were documented as having sustained NAHI were identified. The hospital folders were the primary source of data; this information was then cross-checked with the records of the social work department.

Data collected

Data included name, hospital number, date of admission, gender, age, given mechanism and type of injury sustained, site

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of occurrence and circumstances of the assault and neurological status.

All imaging in the form of skull radiographs and computerised tomography (CT) scans were reviewed, and fractures and intracranial abnormalities documented.

Only patients with a clear-cut craniocerebral injury with at least a scalp haematoma or laceration, skull fracture or evident brain injury on CT scan were included. All children with ocular or facial injuries only were excluded, as were children injured in conflict with other children.

Abuse was confirmed either by a witness presenting to the trauma unit or by means of an interview with the social worker. In only 2 cases was it necessary to make the diagnosis based simply on an inadequate explanation of the child's injuries.

Statitistical methods

Associations were expressed as relative risk with 95% confidence intervals. Proportions were compared using the uncorrected chi-square test. Medians were compared using the Mann-Whitney *U*-test.

Results

Over the 3-year period, 68 children sustained NAHI in 70 assaults, with 2 children assaulted twice. In analysing the data it was apparent that there were 2 subgroups; 37 children (53%) were the intended target of the assault, while allegedly 33 (47%) were not. The latter group we refer to as 'shield injuries'. There were 25 boys and 12 girls in the target group and 18 boys and 15 girls in the shield group (Fig. 1).

The median age of the target group was 2 years (interquartile range 8 months - 2 years) and that of the shield group was 9 months (interquartile range 2 months - 2 years) ($p = 0.005$ Mann-Whitney *U*-test).

Forty-five injuries (65%) resulted from direct blows while 17 (24%) were due to falls or being thrown against a wall, and only 1 injury was due to shaking. This child sustained subdural and subarachnoid haemorrhage although no retinal haemorrhages were identified. A further 2 children had clinical features typical of child abuse, with healing long-bone fractures and skin stigmata such as ecchymoses. Both deaths occurred in children who had been thrown against a wall.

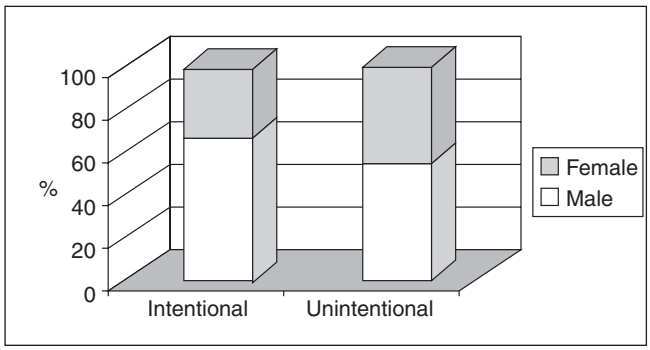

Fig. 1. Gender of children with craniocerebral non-accidental injuries.

Sixteen children were struck with the fist or hand of their assailant while 33 were injured by a weapon, either blunt or sharp. The median age of children intentionally assaulted with a weapon was 4 years and those unintentionally injured was 13 months ($p = 0.004$ Mann-Whitney *U*-test). No child was deliberately stabbed but 4 were stabbed in assaults directed at an adult.

Injuries ranged from scalp lacerations and subgaleal haematomas to skull fractures and severe intracranial injuries. Twenty-eight children sustained skull fractures including linear fractures (18), depressed fractures (6) and basilar fractures (4). Vault fractures were frontal in 5 children (of whom 4 were shield injuries, $p = 0.08$), parietal in 9 (of whom 6 were the intended victim) and multiple in 8, all of whom had at least 1 parietal linear fracture. Twenty children had various intracranial abnormalities on CT scan including cerebral contusion (10), subdural haematoma (9), subarachnoid haemorrhage (5) and a single extradural haematoma.

Of the 70 assaults, 57 were committed by men, 9 by women, and in 4 cases the assailant was not identified. The man was usually the child's father (31) or another family member (14) and the assault occurred in the child's home in 60 cases (85%). The assailant was male in all the shield cases ($p = 0.001$, Fisher's exact test) (Fig. 2). His intended victim was female in 28 cases (85%), almost invariably the child's mother (Fig. 3).

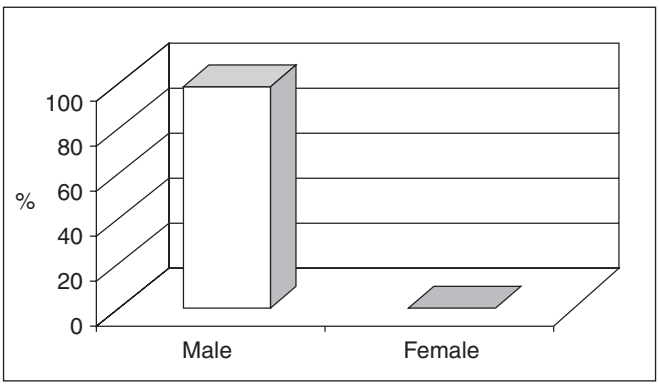

Fig. 2. Gender of assailants in shield cases.

Discussion

Recognition of NAHI is an essential task for all who care for children, not only because of the high mortality but also because of the devastating long-term morbidity in many survivors.[4,7]

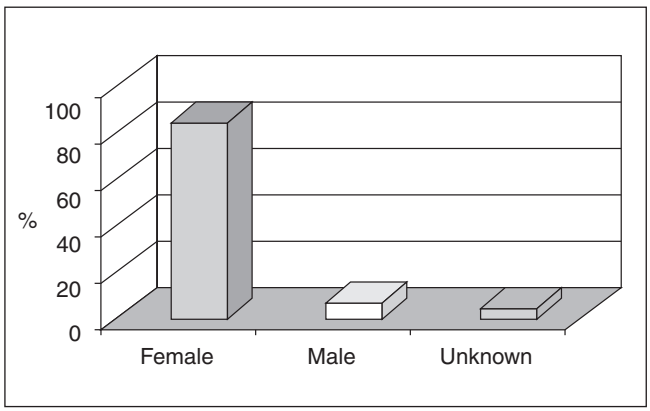

Fig. 3. Gender of intended adult victim in shield cases.

Caffey[8] reported on a series of infants with multiple long-bone fractures and subdural haematomas who had no history of traumatic injury. Following the description by Kempe *et al*.[1] of the battered child syndrome in 1962, Guthkelch[9] emphasised the frequent occurrence of subdural haematomas in these children. He suggested that this results from the repeated acceleration/deceleration of being shaken rather than struck.

Caffey[2] introduced the term whiplash shaken infant syndrome (WSIS) in 1974, based largely on actions admitted to in evidence of fatal cases of child abuse. The proposed mechanism underlying this concept was that of a diffuse axonal injury, although the theoretical basis of this has recently been questioned.[10]

Hahn *et al*.[11] investigated the mechanism of trauma in 77 abused children presenting over a 10-year period and reported that 54% of all injuries were caused by direct blows to the head, 35% were due to dropping, falling or being thrown, and only 8% were due to shaking. In their series, 53% of the assaults were committed by parents and 85% of the patients were below the age of 2 years.

NAHI may occur in many guises but the commonest mechanisms include SIS in infants, direct assault of older children, and those accidentally caught in the crossfire of environmental violence. The literature on NAHI has focused largely on SIS, to the extent that these terms may sometimes be taken to be synonymous.

However, recent studies have shed new light on possible mechanisms of brain injury in abused infants. Geddes *et al*.[12] reported detailed neuropathological data on 53 fatal cases of child abuse and found little evidence for diffuse axonal injury but described extensive hypoxic-ischaemic injury in the majority. New imaging strategies such as diffusion-weighted imaging have also underscored the central role of ischaemic brain injury.[13]

Since the majority of abused children with head injury admitted to RCH seemed to have suffered direct blows rather than shaken-impact injury, this 3-year retrospective study was undertaken to define which mechanisms of injury obtained in our environment.

Only 1 child had the diagnosis of SIS, while a high proportion of injuries (64%) were sustained due to direct blows and 24% were due to falls or being thrown. The low incidence of SIS in this cohort underscores the importance of local research, rather than making assumptions based on studies from abroad.

Both deaths occurred in children who had been thrown across the room against a wall. Consistent with most studies, we found abused children to be young (80% under 3 years of age) and male (61%).

A particular point of interest was the observation that in nearly half (47%) of all cases the injured child was not the intended target of the assailant. The assailant was invariably male and his intended adult victim female in the vast majority of cases.

All the 33 children in this 'unintentional' group were under 3 years of age (median age 9 months) and only 54% were male. All the children who sustained penetrating injuries were in this group. Although skull fractures occurred nearly as often in this group as in the intentional group (36% v. 43%), 33% of the fractures were frontal compared with 6% in the latter.

The use of the term 'shield' should not be taken to imply that in all cases the child was deliberately used in this way to ward off an assailant. It is not possible in a retrospective study such as this to be sure of the exact circumstances surrounding each assault, but in discussion with social workers it seemed that in a number of instances this may well have been the case.

Given the difficulty in distinguishing between intentional use of the child as a shield and reflex shielding or accidental injury to the child, this question can only be addressed in a prospective study. However, some injuries, such as penetrating injuries, may well be more indicative of shielding, whether reflex or intentional, as an adult would not need a weapon such as a knife when attacking a small child.

The younger median age of the unintentional group might reflect the fact that younger children are more likely to be carried, but may also be due to the fact that it would be easier to pick up a small child. Perhaps an expectation that an assailant would be less likely to injure an infant may also contribute to the high proportion of small children involved.

The pattern of injuries in this group showed a wide range, which may reflect some children being struck with full force while others were hit tangentially while being swung up in front of the intended victim.

Although the mechanism of shielding is widely recognised in social work practice in our hospital, this has received little attention in the literature. A single case was described by Nelson in 1984.[14] This may be of particular relevance in our

society, possibly reflecting a high rate of interpersonal violence, the domestic nature of which is underscored by the fact that fully 86% of the injuries occurred in the child's own home.

Until recently there were few data on the epidemiology of domestic violence in South Africa.[15] Lachman[16] investigated the prevalence of reported child abuse in Cape Town and compared this with the international literature. The incidence of reported physical abuse was lower than expected and this was ascribed to under-recognition of child abuse owing to the high prevalence of violence in this community. Males were found to be more prone to physical abuse, and the majority of cases were intra-familial.

The tragedy of domestic or intimate partner violence is increasingly being recognised as a major health care issue.[17] There is often an overlap of child abuse and wife abuse and this has many deleterious effects on both the physical and mental health of women and children.[18] The current study clearly demonstrates that the problems of NAI and domestic violence are inseparable and any attempts to address child abuse must take the social context into account.

The typical scenario we have identified is a man, usually the child's father, assaulting the mother at home. This presents a particularly poignant challenge in a nation where the rights of the child are enshrined in the Constitution, and calls for concerted action to protect the most vulnerable members of society in the very place that they should be safest.

We thank Professor Max Klein and Dr Marta Lik for their valuable comments and Debbie Moodie for expert secretarial assistance.

References

1. Kempe CH, Silvermann FN, Steel BF, Droegemueller W, Silver HK. The battered-child syndrome. *JAMA* 1962; **181:** 102-112.
2. Caffey J. The whiplash shaken infant syndrome: Manual shaking by the extremities with whiplash-induced intracranial and intraocular bleedings, linked with residual permanent brain damage and mental retardation. *Pediatrics* 1974; **54:** 396-403.
3. Duhaime AC, Gennarelli TE, Thibault LE, Bruce DA, Margulies SS, Wiser R. The shaken baby syndrome: a clinical, pathological, and biochemical study. *J Neurosurg* 1987; **66:** 409-415.
4. Duhaime AC, Christian C, Moss E, Seidl T. Long-term outcome in infants with the shaking-impact syndrome. *Pediatr Neurosurg* 1996; **24:** 292-298.
5. Brown JK, Minns RA. Non-accidental head injury, with particular reference to whiplash shaking injury and medico-legal aspects. *Dev Med Child Neurol* 1993; **35:** 849-869.
6. Argent AC, Bass DH, Lachman PI. Child abuse services at a children's hospital in Cape Town, South Africa. *Child Abuse Negl* 1995; **19:** 1313-1321.
7. Prasad M, Ewing-Cobbs L, Swank PR, Kramer L. Predictors of outcome following traumatic brain injury in young children. *Pediatr Neurosurg* 2002; **36:** 64-74.
8. Caffey J. Multiple fractures of the long bones of infants suffering from subdural hematomas. *Am J Roentgenol* 1946; **56:** 163-173.
9. Guthkelch AN. Infantile subdural haematoma and its relationship to whiplash injuries. *BMJ* 1971; **2:** 430-431.
10. Ommaya AK, Goldsmith W, Thibault L. Biomechanics and neuropathology of adult and paediatric head injury. *Br J Neurosurg* 2002; **16:** 220-242.
11. Hahn YS, Raimondi AJ, McLone DG, Yamanouchi Y. Traumatic mechanisms of head injury in child abuse. *Child's Brain* 1983; **10:** 229-241.
12. Geddes JF, Vowles GH, Hackshaw AK, Nickols CD, Scott IS, Whitwell HL. Neuropathy of inflected head injury in children: II. Microscopic brain injury in infants. *Brain* 2001; **124:** 1299-1306.
13. Stoodley N. Non-accidental head injury in children: gathering the evidence. *Lancet* 2002; **360:** 271-272.
14. Nelson KG. The innocent bystander: The child as the unintended victim of domestic violence involving deadly weapons. *Pediatrics* 1984: **73:** 251-252.
15. Jewkes R, Penn-Kekana L, Levin J, Ratsaka M, Schrieber M. Prevalence of emotional, physical and sexual abuse of women in three South African provinces. *S Afr Med J* 2001; **91:** 421-428.
16. Lachman PI. Reported child abuse and neglect in Cape Town. MD thesis, University of Cape Town, 1997.
17. Jewkes R. Intimate partner violence. *Lancet* 2002; **359:** 1423-1429.
18. Campbell JC, Lewandowski LA. Mental and physical health effects of intimate partner violence on women and children. *Psychiatr Clin North Am* 1997; **20:** 353-374.

Accepted 19 January 2004.